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Docket No. 58102-DIV (71987)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: C. Huang

U.S. SERIAL NO.: 10/787,269 GROUP: 2814

FILED: February 25, 2004 EXAMINER: P. Cao

FOR: SEMICONDUCTOR PACKAGE WITH HEAT DISSIPATING
STRUCTURE

CERTIFICATE OF EXPRESS MAILING

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on this date October 26, 2005 in an envelope as "Express Mail Post Office to Addressee," mailing Label Number EV711317473US addressed to the: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

By: Michelle Chicos
Michelle P. Chicos

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

REQUEST FOR RECONSIDERATION OF
"DECISION ON PETITION TO MAKE SPECIAL UNDER 37 CFR §1.102(d)"

In response to the "Decision on Petition to Make Special" dated August 26, 2005 (hereinafter "Decision"), Applicant respectfully requests reconsideration of the Decision.

On page 2 of the Decision, it was stated that "a detailed discussion of how each of the references overcomes *each* of the independent claims is required for the petition to be granted."

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Enclosed herewith is a document titled "SUPPLEMENTARY DISCUSSION OF THE REFERENCES AND INDEPENDENT CLAIMS 16, 29 AND 38" (hereinafter "Supplementary Discussion"), which includes a discussion of how each of the independent claims 16, 29, and 38 distinguishes from the identified references.

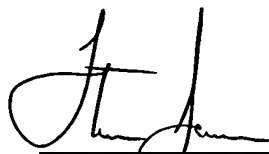
In other words, the Supplementary Discussion addresses each of the independent claims, and provides a detailed discussion of how each of the independent claims is not met by each of the references, as required in the Decision dated August 26, 2005.

It is believed that the Supplementary Discussion enclosed herewith in combination with the Petition to Make Special – Accelerated Examination and attachments filed on March 8, 2005 are sufficient to satisfy the requirements of 37 CFR §1.102(d) and MPEP §708.02 (VIII).

Reconsideration and approval of the Petition to Make Special are respectfully requested.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 04-1105, under Order No. 58102 (71987).

Respectfully submitted,



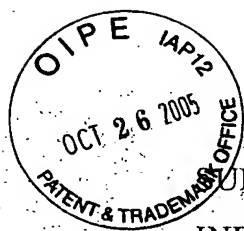
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SUPPLEMENTARY DISCUSSION OF THE REFERENCES AND INDEPENDENT CLAIMS 16, 29 AND 38

This divisional application is directed to a heat dissipating structure for a semiconductor package, as claimed in claims 16 to 45, wherein claims 16, 29 and 38 are independent claims. A discussion on the disclosure of each of the references deemed most closely related to the claimed subject matter of this application has been submitted on March 8, 2005. A supplementary discussion on the references and each of the independent claims 16, 29 and 38 is here provided. It is appreciated that the discussion submitted on March 8, 2005 and the supplementary discussion are both considered.

Prior arts Relating to Heat Dissipating Structure for Semiconductor Package

1. U.S. Patent No. 5,397,917 to Ommen et al. (hereinafter Ommen)

Ommen discloses protective cap 30 in FIG. 1 (column 5, lines 7-45), which defines an enclosed space under central depression 36 and surrounded by raised portion 35; since there is no encapsulation resin over or around the protective cap 30, die 25 and conductive wires 29 must be received in the enclosed space to be hermetically isolated from the atmosphere.

Ommen does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edges of the flat portion, wherein a space is formed between two adjacent support portions such that conductive elements (bonding wires) can pass through the space to reach an area on the substrate outside coverage of the heat dissipating structure and passive components are located on the substrate within and/or outside the coverage of the heat dissipating structure, as recited in claim 16 of this application.

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Ommen does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is sufficiently dimensioned to accommodate conductive elements (bonding wires) and passive components, as recited in claim 29 of this application.

Ommen does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is dimensioned to have a predetermined height larger than a height of wire loops of bonding wires and a height of passive components, as recited in claim 38 of this application.

2. U.S. Patent No. 5,468,910 to Knapp et al. (hereinafter Knapp)

Knapp discloses protective lid 20 in FIG. 1, which is for preventing molding compound 28 from contacting die 16 and wires 18, such that the protective lid 20 must define an enclosed space where the die 16 and wires 18 are received and isolated from the molding compound 28.

Knapp does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edges of the flat portion, wherein a space is formed between two adjacent support portions such that conductive elements (bonding wires) can pass through the space to reach an area on the substrate outside coverage of the heat dissipating structure and passive components are located on the substrate within and/or outside the coverage of the heat dissipating structure, as recited in claim 16 of this application.

Knapp does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is sufficiently dimensioned to accommodate conductive elements (bonding wires) and passive components, as recited in claim 29 of this application.

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Knapp does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is dimensioned to have a predetermined height larger than a height of wire loops of bonding wires and a height of passive components, as recited in claim 38 of this application.

3. U.S. Patent No. 5,543,663 to Takubo

Takubo discloses heat sink 103 in FIGs. 10-12 and 13-15, which is mounted on a printed circuit board (insulating board 11) and covers a semiconductor device (TCP 102) so as to eliminate damage to the TCP 102. The heat sink 103 is not for use in a semiconductor package unlike the heat dissipating structure recited in claims 16, 29 and 38 of this application.

Moreover, Takubo does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edges of the flat portion, wherein a space is formed between two adjacent support portions such that conductive elements (bonding wires) can pass through the space to reach an area on the substrate outside coverage of the heat dissipating structure and passive components are located on the substrate within and/or outside the coverage of the heat dissipating structure, as recited in claim 16 of this application.

Takubo does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is sufficiently dimensioned to accommodate conductive elements (bonding wires) and passive components, as recited in claim 29 of this application.

Takubo does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is dimensioned to have a predetermined height larger than a height of wire loops of bonding wires and

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a height of passive components, as recited in claim 38 of this application.

4. U.S. Patent No. 5,982,621 to Li

Li discloses heat sink 10 in FIGs. 1-4, which defines a space under face panel section 11 and surrounded by supporting frame section 12, such that CPU 31 and wires 32 are completely received in the space.

Li does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edges of the flat portion, wherein a space is formed between two adjacent support portions such that conductive elements (bonding wires) can pass through the space to reach an area on the substrate outside coverage of the heat dissipating structure and passive components are located on the substrate within and/or outside the coverage of the heat dissipating structure, as recited in claim 16 of this application.

Li does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is sufficiently dimensioned to accommodate conductive elements (bonding wires) and passive components, as recited in claim 29 of this application.

Li does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is dimensioned to have a predetermined height larger than a height of wire loops of bonding wires and a height of passive components, as recited in claim 38 of this application.

5. U.S. Patent No. 6,229,702 to Tao et al. (hereinafter Tao)

Tao discloses heat sink 10 in FIGs. 1, 2A and 2B, which has a rectangular shape and is formed with protrusion area 101 in a central portion thereof and four dents 102 at corners thereof. Tao explicitly indicates that the protrusion area 101 covers die 11

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and bonding wires 16, such that the bonding wires 16 do not pass through a space between two adjacent dents 102 of the heat sink 10.

Therefore, Tao does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edges of the flat portion, wherein a space is formed between two adjacent support portions such that conductive elements (bonding wires) can pass through the space to reach an area on the substrate outside coverage of the heat dissipating structure and passive components are located on the substrate within and/or outside the coverage of the heat dissipating structure, as recited in claim 16 of this application.

Tao does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is sufficiently dimensioned to accommodate conductive elements (bonding wires) and passive components, as recited in claim 29 of this application.

Tao does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is dimensioned to have a predetermined height larger than a height of wire loops of bonding wires and a height of passive components, as recited in claim 38 of this application.

6. U.S. Patent No. 6,359,341 to Huang et al. (hereinafter Huang (I))

Huang (I) discloses heat spreader 7 in FIG. 3 comprising flat portion 70 and skirt portion 71, such that chip and wires are completely received in a space defined under the flat portion 70 and surrounded by the skirt portion 71.

Huang (I) does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edges of the flat portion, wherein a space is formed between two adjacent support portions such that conductive elements (bonding wires) can pass through the space to reach an area on the substrate

outside coverage of the heat dissipating structure and passive components are located on the substrate within and/or outside the coverage of the heat dissipating structure, as recited in claim 16 of this application.

Huang (I) does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is sufficiently dimensioned to accommodate conductive elements (bonding wires) and passive components, as recited in claim 29 of this application.

Huang (I) does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is dimensioned to have a predetermined height larger than a height of wire loops of bonding wires and a height of passive components, as recited in claim 38 of this application.

7. U.S. Patent No. 6,462,405 to Lai et al. (hereinafter Lai)

Lai discloses heat sink 34 in FIG. 1, which is constructed by plane 340 and support members 341. As shown in FIG. 1, chip 31 and gold wire 32 are completely received in a space defined by the plane 340 and support members 341.

Lai does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edges of the flat portion, wherein a space is formed between two adjacent support portions such that conductive elements (bonding wires) can pass through the space to reach an area on the substrate outside coverage of the heat dissipating structure and passive components are located on the substrate within and/or outside the coverage of the heat dissipating structure, as recited in claim 16 of this application.

Lai does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is sufficiently

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dimensioned to accommodate conductive elements (bonding wires) and passive components, as recited in claim 29 of this application.

Lai does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is dimensioned to have a predetermined height larger than a height of wire loops of bonding wires and a height of passive components, as recited in claim 38 of this application.

8. U.S. Patent No. 6,552,428 to Huang et al. (hereinafter Huang (II))

Huang (II) discloses heat spreader 4 in FIGs. 1-3, which forms a containing space 43 for containing chip 3 and gold wires 6.

Huang (II) does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edges of the flat portion, wherein a space is formed between two adjacent support portions such that conductive elements (bonding wires) can pass through the space to reach an area on the substrate outside coverage of the heat dissipating structure and passive components are located on the substrate within and/or outside the coverage of the heat dissipating structure, as recited in claim 16 of this application.

Huang (II) does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is sufficiently dimensioned to accommodate conductive elements (bonding wires) and passive components, as recited in claim 29 of this application.

Huang (II) does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is dimensioned to have a predetermined height larger than a height of wire loops of bonding wires and a height of passive components, as recited in claim 38 of this application.

U.S. Patent No. 5,977,626 to Wang et al. (Applicant's Admitted Prior Art, hereinafter AAPA)

Wang et al. (hereinafter Wang) discloses a heat dissipating structure 33 in FIGs. 5 and 6 of AAPA, which comprises flat portion 330 and single encircled support portion 331 that together define an enclosed receiving space 35 for receiving chip 31, bonding wires 32 and passive components therein.

Wang does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edges of the flat portion, wherein a space is formed between two adjacent support portions such that conductive elements (bonding wires) can pass through the space to reach an area on the substrate outside coverage of the heat dissipating structure and passive components are located on the substrate within and/or outside the coverage of the heat dissipating structure, as recited in claim 16 of this application.

Wang does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is sufficiently dimensioned to accommodate conductive elements (bonding wires) and passive components, as recited in claim 29 of this application.

Wang does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is dimensioned to have a predetermined height larger than a height of wire loops of bonding wires and a height of passive components, as recited in claim 38 of this application.

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Other Prior Arts Cited by the Examiner in the Parent Application

1. U.S. Patent No. 5,652,461 to Ootsuki et al. (hereinafter Ootsuki)

Ootsuki discloses convex heat sink 4a in FIG. 1A, which is mounted on a side of leads 1 and semiconductor chip 3, wherein wires 5 are for electrically connecting the semiconductor chip 3 to an opposite side of the leads 1. The heat sink 4a does not directly relate to the distribution of wires 5 located on the opposite side of the leads 1.

Ootsuki does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edges of the flat portion, wherein a space is formed between two adjacent support portions such that conductive elements (bonding wires) can pass through the space to reach an area on the substrate outside coverage of the heat dissipating structure and passive components are located on the substrate within and/or outside the coverage of the heat dissipating structure, as recited in claim 16 of this application.

Ootsuki does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is sufficiently dimensioned to accommodate conductive elements (bonding wires) and passive components, as recited in claim 29 of this application.

Ootsuki does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is dimensioned to have a predetermined height larger than a height of wire loops of bonding wires and a height of passive components, as recited in claim 38 of this application.

2. U.S. Patent No. 6,246,115 to Tang et al. (hereinafter Tang)

Tang discloses heat sink 32 having a plurality of supportive legs 321 in FIGs. 1-3, wherein each of the supportive legs 321 has its bottom 321c being located outside the

plane of the heat sink 32 such that the substrate 30 can provide a larger chip mounting area, and chips 31 and gold wires 34 are completely received in a space defined by the heat sink 32.

Tang does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edges of the flat portion, wherein a space is formed between two adjacent support portions such that conductive elements (bonding wires) can pass through the space to reach an area on the substrate outside coverage of the heat dissipating structure and passive components are located on the substrate within and/or outside the coverage of the heat dissipating structure, as recited in claim 16 of this application.

Tang does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is sufficiently dimensioned to accommodate conductive elements (bonding wires) and passive components, as recited in claim 29 of this application.

Tang does not teach or suggest a heat dissipating structure comprising a flat portion and a plurality of support portions formed at edge corners of the flat portion, wherein a space is formed between two adjacent support portions and is dimensioned to have a predetermined height larger than a height of wire loops of bonding wires and a height of passive components, as recited in claim 38 of this application.

Therefore, the heat dissipating structure as recited in claims 16, 29 and 38 of this application respectively is patentable over each of the above references or any combination of the references.

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